

of instruction begins with a series of introductory exercises on such fundamental principles as the nature of physical and chemical changes, the common elements and some of their typical compounds, and the processes of combustion, oxidation, reduction, &c. Detailed explanations are to be supplied by the demonstrator, who is also supposed to carry out the more difficult experiments, and to devise the simple apparatus required by the student.

Simple volumetric analysis is introduced at an early stage, but, unfortunately, the underlying principle of equivalence is not adequately explained. Two definitions of equivalent weight are given on p. 54, one referring to acids, and the other to bases and salts. In the latter, equivalent weight is stated to be the molecular weight divided by the sum of the valencies of the metallic radicle. This definition is not applicable to potassium permanganate, an important reagent generally introduced into an elementary course of volumetric analysis. The working instructions for the volumetric analysis and for the determination of equivalents and atomic weights are excellent, and make for neatness and accuracy in quantitative exercises. There are a few singular omissions in the general practical course; formic acid is not indicated as a source of pure carbon monoxide, and although the interaction of copper and hot concentrated sulphuric acid is mentioned thrice, on pp. 13, 92, and 98, no reference is made to the cuprous sulphide which is produced as a bye-product together with copper sulphate.

The last chapter is devoted to qualitative analysis, and contains the practical details of the dry and wet tests for the commonly occurring metals and acids, without equations or other theoretical explanations.

Although an experienced teacher could select, from the large number of practical exercises contained in this treatise, a typical set suitable for an elementary course, yet it would certainly be necessary to add a few simple gravimetric processes such as the estimation of iron, copper, chlorine, or sulphate. Otherwise, the student's practical experience would be sadly lacking in balance, for while having had an opportunity of attempting the preparation of comparatively uncommon compounds, such as phosphine and periodic and bromic acids, he might remain ignorant of the methods of elementary gravimetric analysis.

(2) The author of the second volume under review is of opinion that an elementary practical book should contain more complete explanations than are generally given. This course also begins with the practical study of the non-metallic elements and their typical compounds, but some of this introductory work may be omitted by students who have an opportunity of seeing these experiments demonstrated on the lecture table. The work on the non-metals is followed by the preparation of typical compounds of the metals. These exercises are of special interest to medical and dental students, as a knowledge of the preparations given in detail is required by the syllabus of the Conjoint Board. The list of preparations would be considerably improved by the inclusion of a few double

salts (such as ferrous ammonium sulphate and the alums), some of which are quite suitable for an elementary course. The qualitative tests for the metals and acids are described in considerable detail, equations being given for the more important chemical changes, together with a summary relating to each metal and its notable compounds. Although this part of the book is fairly comprehensive, the tests for nickel and cobalt and for boric and hydrofluoric acids are omitted. In other respects, the qualitative analysis is quite adequately treated in a systematic manner, and the tables are remarkably free from errors. On p. 94 the interaction of a silver salt and sodium hydroxide gives the oxide Ag_2O , whereas on p. 148 the product is said to be the hydroxide AgOH . The first reaction on p. 112 refers to stannous sulphide.

The last chapter contains a brief introduction to quantitative analysis, dealing chiefly with volumetric processes.

(3) The third of the foregoing books has been re-written to meet the present requirements of the Board of Education as regards the elementary stage of practical inorganic chemistry. A description of the properties of some common substances leads up to elementary experiments consisting of observational work and simple quantitative exercises. Full working details are given as well as theoretical explanations. The book is admirably suited to the work of the elementary stage.

G. T. M.

OUR BOOK SHELF.

Bathy-geographical Wall Maps of the Pacific, Atlantic and Indian Oceans. (Edinburgh and London : W. and A. K. Johnston, Ltd.) Price 12s. each.

THESE maps of the oceans are on Mollweide's equal-area projection. The elevations and depressions shown are at 6000, 1500, 600 feet, and below sea-level on the land, while 100, 1000, 2000, 3000, and 4000 fathoms are represented over the sea area.

The elevations shown on the land are scarcely sufficient for the purpose for which these maps are undoubtedly intended, the study of the build of continents, but the sea depths should render them useful to teachers.

Many points are admirably illustrated. The oceanic islands are well shown as the culminating summits of ridges, and the use of such maps should help to correct the erroneous notions often prevalent as to the position of island groups.

The complicated series of islands in the Pacific Ocean can only be understood by reference to a clear ocean map. For example, the islands known as Melanesia, which rest on the submarine plateau to the east of Australia, can be seen to have an intimate connection with the mainland, with which they were once connected. On the outer fringe of these islands are the Solomon Islands and New Hebrides, and the Mikronesian group from the Caroline Islands to the Tonga Islands.

Further to the east the South Pacific chain suggests a possible land connection in former ages between South America and Australia, which may account for the migration of marsupial and land tortoises from one coast to the other.

The fringing chains of islands which extend on the north-west of the Pacific from Formosa to Alaska are admirably shown on this map, in contrast to the deep depressions known as the Tuscarora and Aleutian trenches.

The usual classification of the major submarine forms includes the shelf, the depression, and the elevation. The shelf extends to about 100 fathoms below sea-level. As the lowest ground represented in these maps, from 0 to 600 feet, is coloured green, while the sea to the depth of 100 fathoms is tinted a light blue, students will probably find it somewhat difficult to compare these areas. The maps would have gained considerably if both these regions, from 600 feet to the 100-fathom line, had been left white, and if the names, at any rate on the land, had been omitted. It is surely quite unnecessary to print "AFRICA" across the continent in such large letters as to obscure some of the details of the plateau of Abyssinia.

On the oceans the names are fewer in number, and do not interfere with the graphic effect of the deeper blue which marks the depressions and elevations of the ocean floor.

Though, as regards graphic representation, more suited for reference than school use, these maps have one important advantage. The equal-area projection employed is most effective for the oceans, when shown separately, and the comparison of areas possible should be useful in the study of the relative extent of land and sea.

The Practical Management of Sewage Disposal Works. By W. C. Easdale. Pp. 60. (London: The Sanitary Publishing Co., Ltd., 1909.) Price 2s. net.

THE author has endeavoured with considerable success to deal, in the space of fifty-four small pages, with the more important points arising in the management of small sewage works and private-house installations, &c.

When considering the question of tanks, the author rather unfortunately states that in all types of tanks, *i.e.* sedimentation, precipitation, and septic tanks, the work to be done is the same, *viz.* the removal of suspended matter. This expression is somewhat misleading and liable to misinterpretation.

Apparently, in dealing with the removal of sludge from tanks, septic tanks only are considered, as the author's doctrine of "little and often" removal, without emptying the tank, can only in general be properly applied to such tanks, and, it may be added, only when the design of the tank allows of the removal of the more or less thoroughly septiced sludge. In the case of sedimentation and chemical precipitation tanks, it is almost essential that the sludge should be completely removed at each operation in order to avoid fermentation taking place, with its consequent ill-effect on the complete settlement of the suspended solids.

In connection with the design of contact beds, the author rightly directs attention to the extreme importance of the thorough and complete drainage of the bed, and also to the question of the size of the unit.

It is evident that there is a limit to the application of the maxim "little and often" advocated in regard to the removal of accumulated suspended matter from the surface of the contact beds. From the point of view of economy, cleansing operations should not be carried out too frequently, as it is obvious that a certain amount of filtering media must be removed at each operation, incurring additional cost; while so long as the accumulated suspended matter is not sufficient to impede the drainage from the surface and consequent ingress of air, no detrimental results may be anticipated.

The author's remarks with regard to the attention to be given to distributing apparatus in connection with percolating filters are important, and should be carefully noted. In connection with the final

chapter on tests and records, Spitta's methylene blue test might with advantage be included, and possibly a colour test for nitrates.

The book can be thoroughly recommended for the objects defined in the author's introductory remarks.

E. A.

Das Reich der Wolken und Niederschläge. By Prof. Dr. Carl Kassner. Pp. 160. (Leipzig: Quelle and Meyer, 1909.) Price 1.25 marks.

THIS work, No. 68 of the popular scientific manuals published by Messrs. Quelle and Meyer, is to some extent the outcome of lectures delivered by the author at technical high schools, modified to meet the requirements of general readers. In addition to sound elementary information on the taking and reduction of observations, it includes the results of the most recent investigations, of the fundamental researches of Hann, Hellmann, and others, and useful references to the historical development of this branch of meteorological science. Chapters i.-v. treat of aqueous vapour, condensation, formation of fog and clouds, sunshine and cloudiness. Chapters vi.-x. deal with rainfall, snow and hail, exposure of gauges, calculation of results, &c. The remaining chapters, xi.-xiii., refer to the rainfall over the globe, the causes of its unequal distribution, to daily, yearly, and secular periods. The whole will repay careful perusal; among some of the many points of special interest we may note references to Goethe's appreciation of Howard's classification of clouds, to various kinds of glazed frost and hail, and to the effect of wind and exposure on rainfall records. Hellmann's classification and reproduction of Neuhauss's photographs of snow crystals are preferred to Glaisher's drawings, which the author hints should now be omitted from text-books. On p. 78 we notice that Chepstow is misprinted as Chepstow.

Astronomische Abhandlungen der Hamburg Sternwarte in Bergedorf. Edited by the director, Dr. R. Schorr. Band i. No. 1, pp. 130, and 3 plates; No. 2, pp. 10, and 3 plates; No. 3, pp. 99. (Hamburg, 1909.)

FOUNDED in 1825 by State-aided private means, the Hamburg Observatory was taken over by the State in 1833, and in 1906 was by decree transferred to the new site at Bergedorf. This site and its equipment are briefly described in Dr. Schorr's introduction to the new series of "Abhandlungen" of which that under review is the first volume.

Part i. is by Dr. Dolberg, who describes, and discusses, the latitude determinations made at Hamburg in 1904-6. The observations were made with a Repsold portable transit instrument, and a great part of the time was spent in determining and discussing the instrumental errors. The actual latitude observations were made in 1905, and consisted of 426 complete measures of 90 pairs of stars. These are discussed, with the reductions, at length, and a mean latitude of $53^{\circ} 33' 6.05'' \pm 0.015''$ is found for the position of the circle.

Dr. Graff is responsible for the work described in parts ii. and iii., and in the former he describes his observations, measures and drawings of Saturn during 1907, when the ring system and the earth lay in the same plane. The three plates carry twelve drawings, and form an interesting record of the various appearances of the edges of the rings from July 26 to November 30, 1907.

Part iii. is of less general interest, but is a useful reference work. It contains the places of 580 variable stars, lying between the North Pole and 23° south declination, for the epoch 1900.0. The objects are given under their various constellations first, and are then collected into a general catalogue showing the